TEST REPORT

CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

1. Client

◦ Name : Deepscent Inc.

◦ Address : E19 Nano Fab 9F, KAIST, Daehak-ro 291, Yuseong-gu, Daejeon, South Korea

◦ Date of Receipt : 2019-03-29

2. Manufacturer

◦ Name : Ionics

◦ Address : 606~608, 24, Gasan digital 1-ro, Geumcheon-gu, Seoul, Republic of Korea

3. Use of Report : For FCC Certification

4. Test Sample / Model: AromaStyler / ABV01WDAA

5. Date of Test : 2021-06-10 to 2021-06-12

6. Test Standard(method) used : FCC 47 CFR part 15 subpart C

7. Testing Environment: Temp.: (25 ± 5) ℃, Humidity: (41 ± 3) % R.H.

8. Test Results : Compliance

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

Affirmation	Tested by Bong-jun Jang: (Signature)	Technical Manager Young-taek Lee: (Signature)

2021-06-15

Republic of KOREA **CTK Co., Ltd.**

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REPORT REVISION HISTORY

Date	Revision	Page No
2021-06-15	Issued (CTK-2021-02251)	all

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1. General Product Description

1.1 Client Information

Company	Deepscent Inc.
Contact Point	E19 Nano Fab 9F, KAIST, Daehak-ro 291, Yuseong-gu, Daejeon, South Korea
Contact Person	Name : Jung kiback E-mail : kiback@deepscent.io Tel : +82-10-2688-9688

1.2 Product Information

FCC ID	2ASKL-AROM-HOME-V1
BRAND	Deepscent
Product Description	AromaStyler
Model name	ABV01WDAA
Variant Model name	-
Operating Frequency	13.56 MHz
RF Output Power	14.95 dBuV/m @ 30m
Antenna Specification	PCB Antenna
Type of Modulation	ASK
Power Source	DC 5 V

1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Note Computer	Samsung Electronics Co., Ltd.	NT-R540	ZW3B93AZ900395N
AC/DC Adapter	Tech-Power Electric Co., Ltd.	NT01	09708530

2. Facility and Accreditations

2.1 Test Facility

The measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yong-in-si, Gyeonggi-do, Korea.

2.2 Laboratory Accreditations and Listings

Country	Agency	Registration Number
USA	FCC	805871
CANADA	ISED	8737A-2
KOREA	NRRA	KR0025

2.3 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

3. Test Specifications

3.1 Standards

FCC Part Section(s)	Requirement(s)	Status (Note 1)	Test Condition
15.225(a)	Radiated Electric Field Emissions (13.553 MHz to 13.567 MHz)	NA(Note 5)	Radiated
15.225(b)	Radiated Electric Field Emissions (13.410 MHz ≤ f ≤ 13.553 MHz, 13.567 MHz ≤ f ≤ 13.710 MHz)	NA(Note 5)	
15.225(c)	Radiated Electric Field Emissions (13.110 MHz ≤ f ≤ 13.410 MHz, 13.710 MHz ≤ f ≤ 14.010 MHz)	NA(Note 5)	
15.209	Radiated Electric Field Emissions (9kHz to 30 MHz, 30MHz to 1GHz, 1GHz to 26.5 GHz)	C(Note 4)	
15.207	Conducted Voltage Emissions (150 kHz to 30 MHz)	C(Note 4)	Line Conducted
15.225(e)	Frequency Stability	NA(Note 5)	Conducted
15.215(c)	20 dB Bandwidth	NA(Note 5)	

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The sample was tested according to the following specification: ANSI C63.10-2013

Note 3: The equipment contains an approved single module(FCC ID: 2AC7Z-ESPWROOM32D).
The test result is the same as the single module.

Note 4: Tested under the simultaneous operation of RFID + WiFi.

Note 5: Please refer to the report number CTK-2019-01372.

3.2 Mode of operation during the test

The EUT is operated in a manner representative of the typical of the equipments.
During at testing, system components were manipulated within the confines of typical usage to maximize each emission. All modulation modes were tests.
The results are only attached worst cases.
Tested under the simultaneous operation of RFID + WiFi.

3.3 Device Modifications

The following modifications were necessary for compliance: Not applicable

3.4 Maximum Measurement Uncertainty

The value of the measurement uncertainty for the measurement of each parameter.
Coverage factor k = 2, Confidence levels of 95 %

Description	Uncertainty
Conducted RF Output Power	± 1.5 dB
Power Spectral Density	± 1.5 dB
Occupied Bandwidth	± 0.1 MHz
Unwanted Emission(conducted)	± 3.0 dB
Radiated Emissions (f ≤ 1 GHz)	± 4.0 dB
Radiated Emissions (f > 1 GHz)	± 5.0 dB

3.5 Test Software

Radiated Test	TOYO EMI software EP5RE Ver. 5.1.0
Line Conducted Test	ESCI7, ESCI3 : EMC32 Ver. 8.50.0 ESR7 : EMC32 Ver. 8.53.0

4. Technical Characteristic Test

4.1 Radiated Electric Field Emissions - 15.225(d), 15.209

Reference Standard
FCC Part 15.225(d), 15.209

Test Location
☒ 10 m SAC (test distance : ☐ 10 m, ☒ 3 m)
☒ 3 m SAC (test distance : 3 m)

Test Procedures
1) In the frequency range of 9 kHz to 30 MHz, magnetic field is measured with Loop Antenna. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
2) In the frequency rage above 30 MHz, Bi-Log Test Antenna(30 MHz to 1 GHz) and Horn Test Antenna(above 1 GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is carried from 1m to 4m above the ground to determine the maximum value of the field strength. The emissions levels at both horizontal and vertical polarizations should be tested.

Instrument Settings
Frequency Range = 9 kHz ~ 25 GHz (2.4 GHz 10^{th} harmonic)

a) RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz, 9 kHz for f < 30 MHz

b) VBW ≥ RBW

c) Sweep time = auto couple

Limit :

FCC Part 15 § 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in Table 2 Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

Table 2. General Field Strength Limits for Licence-Exempt Transmitters

Frequency(MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	48.5 – 13.8	300
0.490-1.705	24000/F(kHz)	33.8 – 23	30
1.705-30	30	29.5	30
30-88	100**	40	3
88-216	150**	43.5	3
216-960	200**	46	3
Above 960	500	54	3

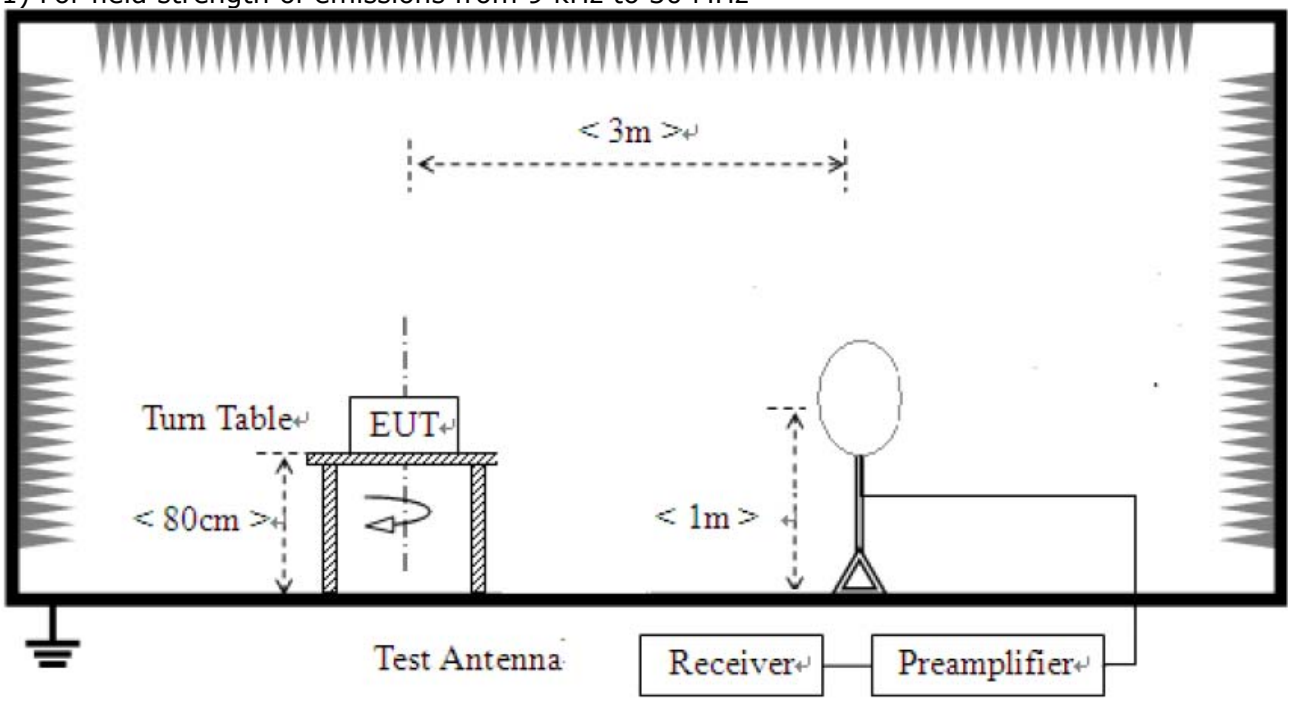
** Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.

Note :

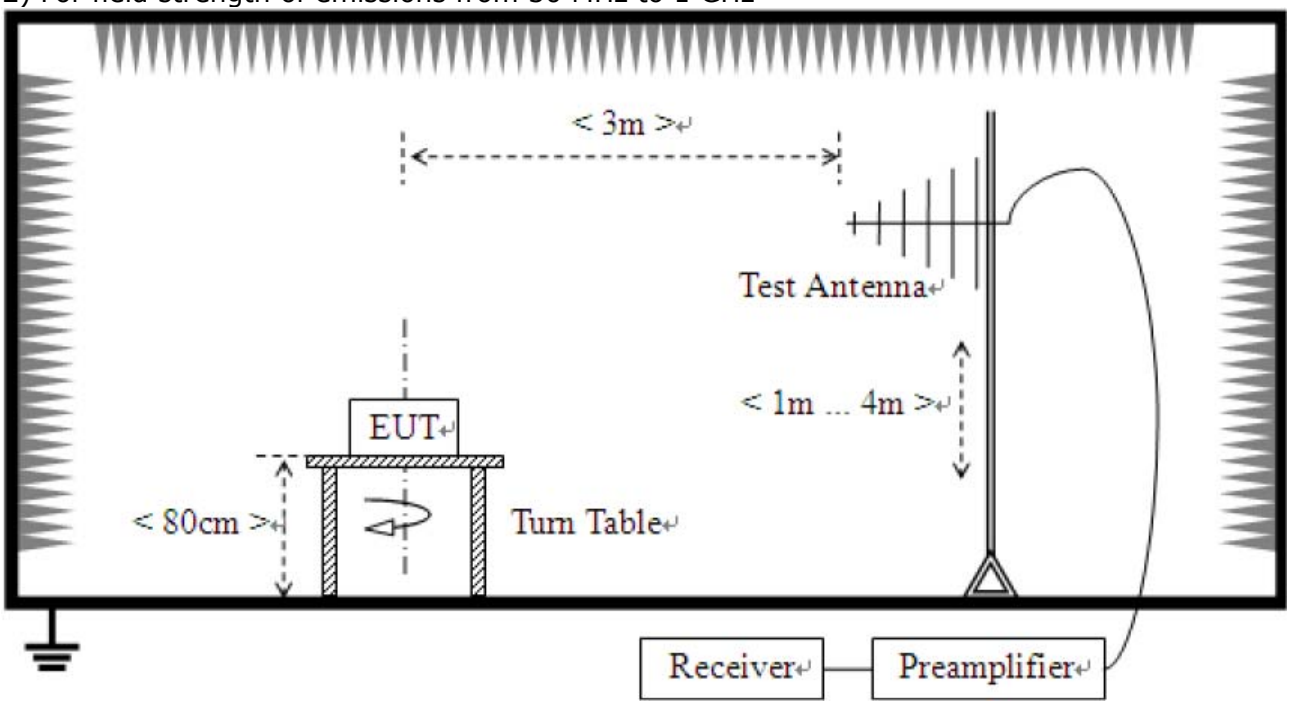
1) For above 1 GHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.
2) For above 1 GHz, limit field strength of harmonics : 54 dBuV/m@3m (AV) and 74 dBuV/m@3m (PK)

Test Setup:

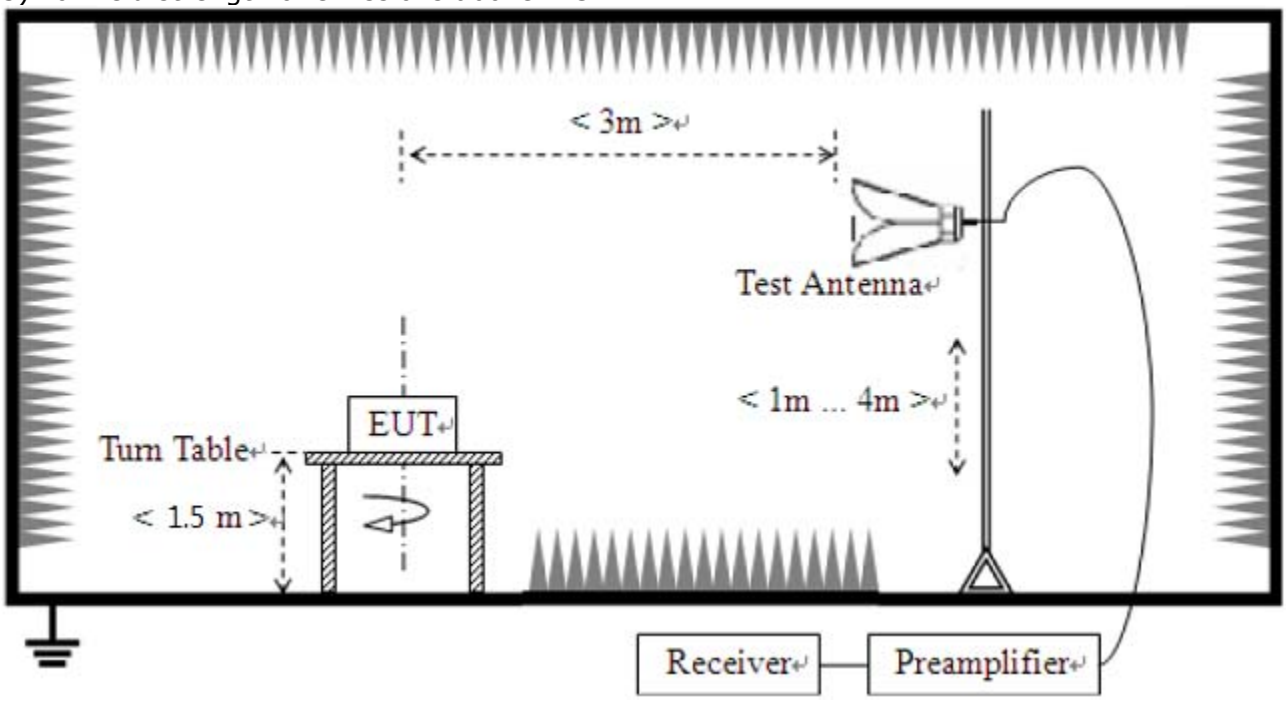
1) For field strength of emissions from 9 kHz to 30 MHz



2) For field strength of emissions from 30 MHz to 1 GHz

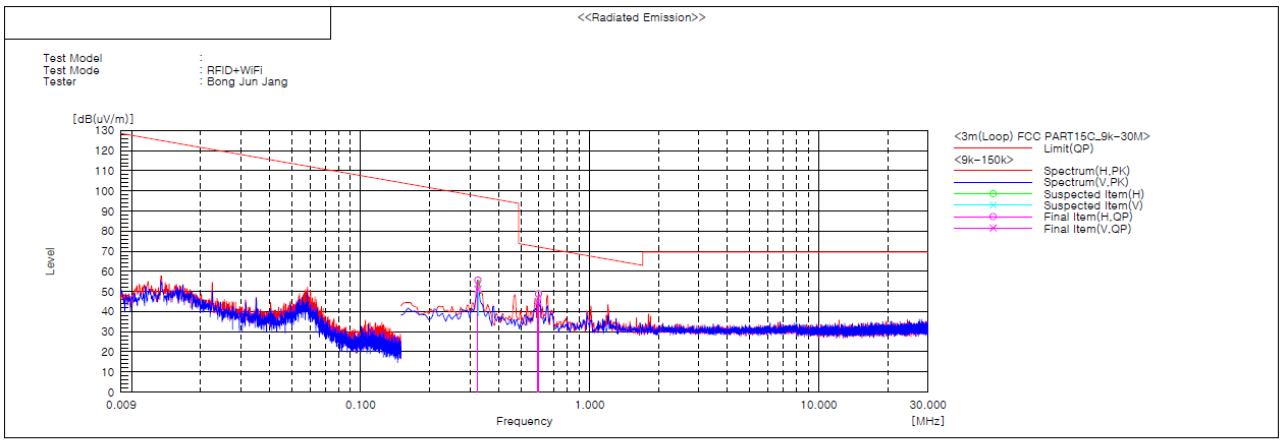


3) For field strength of emissions above 1 GHz



Test Data :

1. 9 kHz to 30 MHz



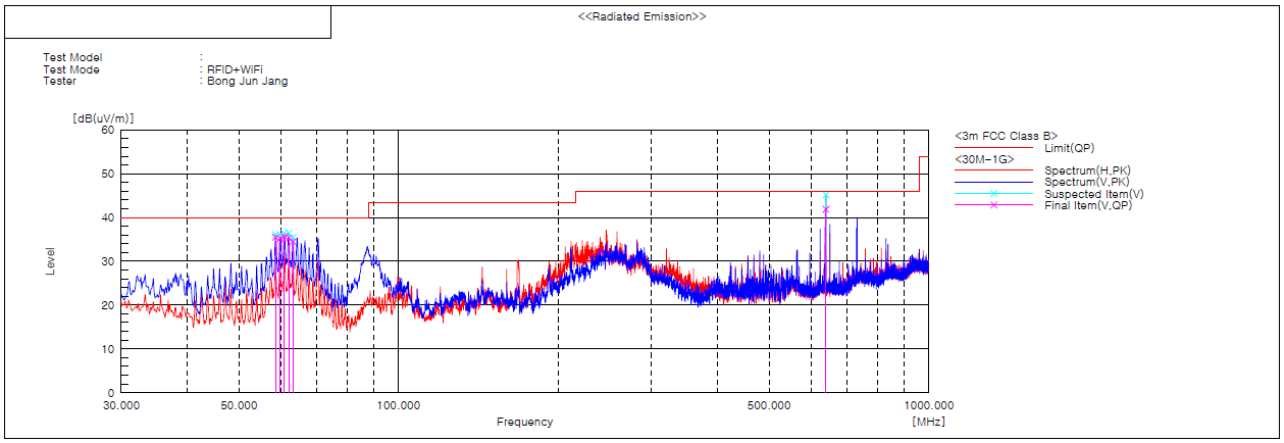
Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	0.325	H	30.6	25.0	55.6	97.4	41.8	100.0	279.0
2	0.598	H	23.9	24.9	48.8	72.1	23.3	100.0	312.0
3	0.325	V	26.1	25.0	51.1	97.4	46.3	100.0	222.0
4	0.594	V	20.0	24.9	44.9	72.1	27.2	100.0	7.0

Note :

1. The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
2. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
3. Test condition: RFID + WiFi simultaneous transmission status.

2. 30 MHz to 1 GHz



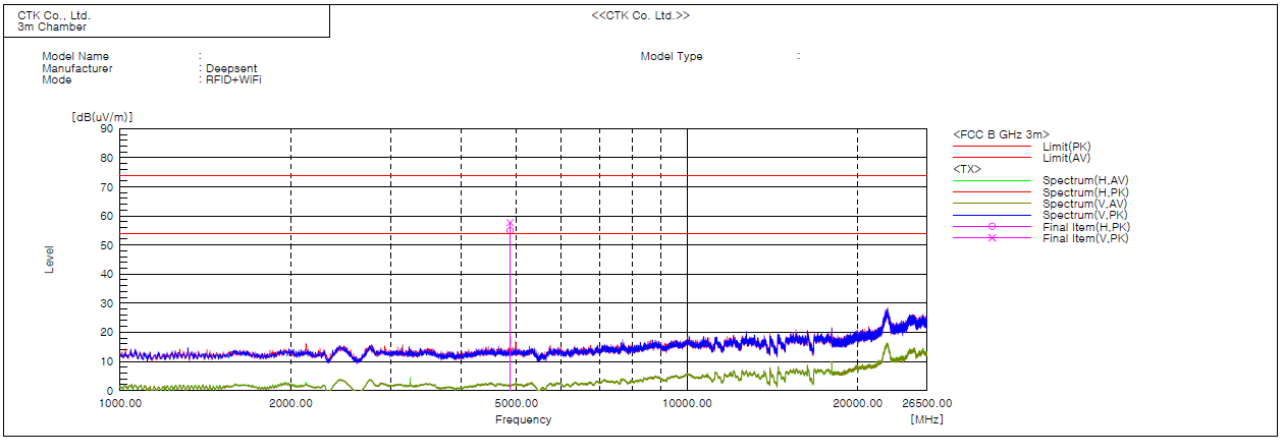
Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	58.615	V	54.0	-18.5	35.5	40.0	4.5	194.0	272.0
2	59.828	V	53.7	-18.5	35.2	40.0	4.8	194.0	249.0
3	60.919	V	54.2	-18.5	35.7	40.0	4.3	194.0	249.0
4	62.131	V	53.7	-18.4	35.3	40.0	4.7	101.0	280.0
5	63.223	V	53.0	-18.5	34.5	40.0	5.5	194.0	238.0
6	640.009	V	40.4	1.5	41.9	46.0	4.1	101.0	21.0

Note :

1. The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain
4. This data is the Quasi-peak(QP) value.
5. Test condition: RFID + WiFi simultaneous transmission status.

3. 1 GHz to 26.5 GHz



Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Limit PK [dB(uV/m)]	Margin PK [dB]	Height [cm]	Angle [deg]
1	4873.875	V	56.1	1.6	57.7	74.0	16.3	99.8	0.0
2	4873.875	H	53.3	1.6	54.9	74.0	19.1	234.3	0.0

Note :

1. The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(Y axis) and the worst case was recorded.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain
4. This data is the Peak(PK) value.
5. Test condition: RFID + WiFi simultaneous transmission status.

4.2 Conducted Voltage Emissions – 15.207

A radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that the radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz-30 MHz, shall not exceed the limits.

Instrument Settings

IF Band Width: 9 kHz

Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.
Amplitude measurements were performed with a quasi-peak detector and an average detector.

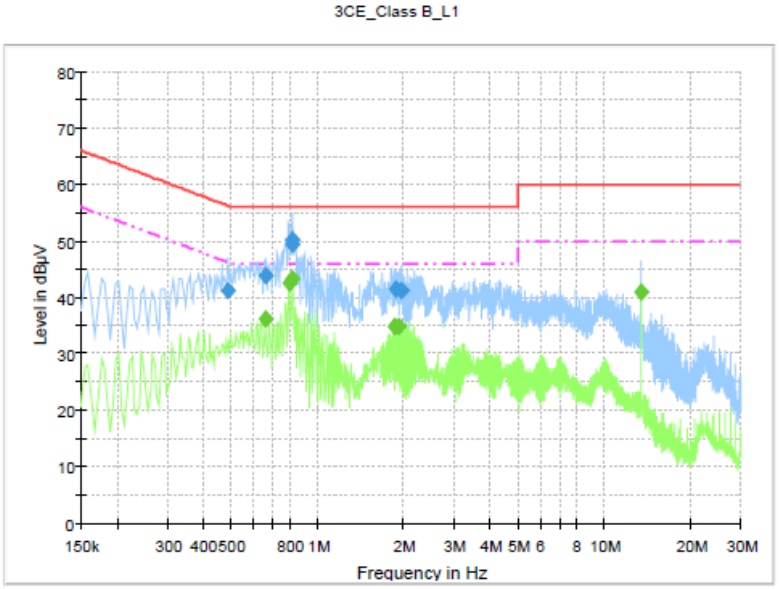
Limit

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average**
0.15 ~ 0.5	66 to 56*	56 to 46*
0.5 ~ 5	56	46
5 ~ 30	60	50

* The level decreases linearly with the logarithm of the frequency.
** A linear average detector is required.

Test Data :

[Line : L1]



Final Result 1

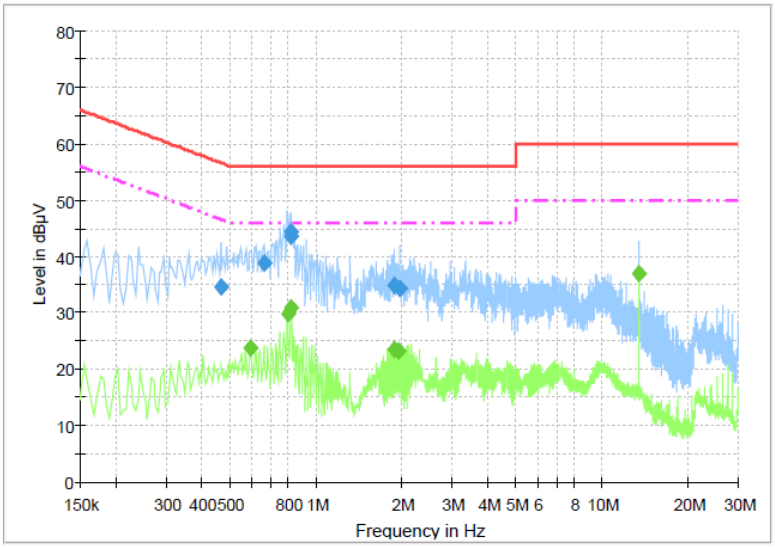
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.487500	41.2	1000.0	9.000	On	L1	9.9	15.0	56.2
0.658500	43.9	1000.0	9.000	On	L1	9.9	12.1	56.0
0.816000	49.3	1000.0	9.000	On	L1	9.8	6.7	56.0
0.820500	50.2	1000.0	9.000	On	L1	9.8	5.8	56.0
1.878000	41.4	1000.0	9.000	On	L1	9.8	14.6	56.0
1.968000	41.1	1000.0	9.000	On	L1	9.8	14.9	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.658500	36.2	1000.0	9.000	On	L1	9.9	9.8	46.0
0.798000	42.4	1000.0	9.000	On	L1	9.8	3.6	46.0
0.820500	43.3	1000.0	9.000	On	L1	9.8	2.7	46.0
1.855500	34.8	1000.0	9.000	On	L1	9.8	11.2	46.0
1.923000	34.9	1000.0	9.000	On	L1	9.8	11.1	46.0
13.564500	40.9	1000.0	9.000	On	L1	9.9	9.1	50.0

[Line : Neutral]

3CE_Class B_N



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.465000	34.7	1000.0	9.000	On	N	9.9	21.9	56.6
0.658500	38.8	1000.0	9.000	On	N	9.9	17.2	56.0
0.816000	43.6	1000.0	9.000	On	N	9.8	12.4	56.0
0.820500	44.3	1000.0	9.000	On	N	9.8	11.7	56.0
1.878000	34.8	1000.0	9.000	On	N	9.8	21.2	56.0
1.968000	34.5	1000.0	9.000	On	N	9.8	21.5	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.591000	23.7	1000.0	9.000	On	N	9.9	22.3	46.0
0.798000	30.0	1000.0	9.000	On	N	9.8	16.0	46.0
0.820500	30.9	1000.0	9.000	On	N	9.8	15.1	46.0
1.878000	23.5	1000.0	9.000	On	N	9.8	22.5	46.0
1.945500	23.2	1000.0	9.000	On	N	9.8	22.8	46.0
13.564500	37.0	1000.0	9.000	On	N	9.9	13.0	50.0

APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Receiver	Rohde & Schwarz	ESCI7	100814	2019-10-20	2021-10-20
2	Bilog Antenna	Schaffner	CBL6111C	2551	2021-03-22	2023-03-22
3	Active Loop Antenna	SCHWARZBECK	FMZB 1513	1513-125	2020-05-20	2022-05-20
4	6dB Attenuator	R&S	DNF	272.4110.50-2	2020-10-23	2021-10-23
5	6dB Attenuator	BIRD	5W 6dB	1744	2020-12-16	2021-12-16
6	AMPLIFIER	SONOMA	310	291721	2021-01-22	2022-01-22
7	EMI Test Receiver	Rohde & Schwarz	ESU40	100336	2021-01-12	2022-01-12
8	Double Ridged Guide Antenna	ETS-Lindgren	3117	00154525	2020-10-14	2021-10-14
9	Horn Antenna	SCHWARZBECK	BBHA9170	00967	2020-06-02	2021-10-14
10	Low Noise Amplifier	TESTEK	TK-PA1840H	200115-L	2021-05-21	2022-05-21
11	Preamplifier	Agilent	8449B	3008A02011	2020-11-30	2021-11-30
12	Band Reject Filter	Micro Tronics	BRM50702	363	2021-03-30	2022-03-30
13	LISN	Rohde & Schwarz	ENV216	101235	2021-01-12	2022-01-12
14	EMI Test Receiver	Rohde & Schwarz	ESCI3	100032	2021-01-15	2022-01-15

No.	Name of Equipment	Manufacturer	Model No.	Serial No.	Check Date
1	RF Cable (conducted)	Junkosha Inc.	MWX221	1510S087	2020-02-02
2	3m Loop Cable (Radiated)	HUBER+SUHNER	N/A	N/A	2019-10-25
3	3 m 1GHz Above RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 104	MY27558/4	2020-01-28
4	3 m 1GHz Below RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 104	N/A (below 1GHz)	2020-01-28
5	3 m 1GHz Above RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 104	MY27573/4	2019-12-12
6	3 m 1GHz Above RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 104	801924/4	2019-12-12
7	3 m 1GHz Above RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 102	MY4728/2	2020-02-02
8	3 m 1GHz Above RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 102	MY2374/2	2020-02-02